

FACT SHEET

FOR THE DRAFT AUTHORIZATION TO DISCHARGE TO WATERS OF THE UNITED STATES UNDER THE OKLAHOMA POLLUTANT DISCHARGE ELIMINATION SYSTEM (OPDES).

Permit Number: OK0029190

Facility ID Number: S-20616

Applicant: City of Norman
P.O. Box 370
Norman, OK 73070

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In accordance with 40 CFR 124.8 and 124.56, this fact sheet describes the applicant's facility operation and sets forth the principal facts and the significant factual, legal, methodological, and policy questions considered in preparing the draft permit. Also set forth are any calculations or other necessary explanations of the derivation of specific effluent limitations and conditions or standards for sewage sludge use or disposal, including a citation to the applicable performance standard, or standard for sewage sludge use or disposal as required by 40 CFR 122.44. In accordance with 40 CFR 122.44(l), proposed permit limits for reissued permits are based on the more stringent of applicable technology-based limitations, applicable water quality-based limitations or limitations in the previous permit.

Citations to 40 CFR refer to promulgated regulations listed at Title 40, Code of Federal Regulations. Citations to OAC 252 and OAC 785 refer to promulgated regulations listed at Titles 252 and 785, Oklahoma Administrative Code.

I. PERMITTING BACKGROUND

A. CHRONOLOGY OF PERMITTING ACTIVITIES

The following is a chronology of permitting activities since issuance of the previous OPDES permit.

January 19, 2005:	Additional comments on the draft permit from the applicant received.
December 10, 2004:	Draft permit package sent to applicant for <i>public notice</i> .
December 6, 2004:	EPA no objection letter received.
October 14, 2004:	Comments on the draft permit from the applicant received.
October 1, 2004:	Draft permit package sent to applicant and EPA for courtesy review.
July 15, 2004:	Administrative review of permit application completed.
July 12, 2004:	Site visit conducted.
June 22, 2004:	OPDES permit application (Form 2M1) received.
November 18, 1999:	Previous OPDES permit issued.

B. PROPOSED PERMITTING ACTION

It is proposed that Permit No. OK0029190, which was effective November 18, 1999, and expires December 17, 2004, and for which application for renewal was timely submitted prior to permit expiration, be reissued for a five year term in accordance with regulations promulgated at 40 CFR 122.46(a) and OAC 252:606-1-3(b).

II. APPLICANT ACTIVITY

A. DESCRIPTION AND LOCATION OF FACILITY

The facility is located in the S½, SE¼, SE¼, Section 7, Township 8 North, Range 2 West, Indian Meridian, Cleveland County. Under SIC code 4952, the facility provides biological treatment of domestic sewage for the City of Norman.

B. WASTEWATER GENERATION AND TREATMENT

1. Treatment Plant

The facility's design flow of 12.0 million gallons per day (mgd) is less than that specified in the State Water Quality Management Plan (WQMP). Biological treatment of the wastestream into this POTW facility, comprised primarily of domestic sewage, is by activated sludge.

2. Industrial Contributions

The POTW facility does receive industrial wastewaters. The facility's design flow is 12.0 mgd and it has been required to develop an industrial pretreatment program in accordance with 40 CFR 403.8(a). Categorical industrial users (CIUs) are industries for which pretreatment standards have been promulgated by EPA at 40 CFR 405-499. Significant industrial users (SIUs) are defined at 40 CFR 403.3(t). In addition to CIUs, SIUs are those industries which discharge an average of 25,000 gpd or more of process wastewater to the POTW, contribute a process wastestream which makes up 5% or more of the average dry weather hydraulic or organic loading capacity of the POTW, or are designated as such by a pretreatment program control authority (as defined in 40 CFR 403.12(a)) on the basis that there is reasonable potential for the industrial user to violate a pretreatment standard or adversely affect the POTW's operation.

According to the permit application, the categorical and significant industrial users (IUs) discharging to the Norman POTW are as follows:

a. CIUs

- York International Corporation
Operation: Commercial and industrial HVAC units
- Shaklee Corporation
Operation: Nutritional supplements and pharmaceutical
- Hiland Dairy Foods
Operation: Dairy products

b. SIUs

- Norman Regional Hospital
- University of Oklahoma – Physical Plant
- University of Oklahoma – Fred Jones Jr. Memorial Arts Center
- University of Oklahoma – Carson Engineering Center
- University of Oklahoma – Physical Sciences Center
- University of Oklahoma – Chemistry Annex
- University of Oklahoma – Sarkey Energy Center
- University of Oklahoma – Well Construction Technologies Center
- Bio-Cide International, Inc.
- United States Geological Survey
- City of Norman Solid Waste Transfer Station
- C & C Trailers, Inc.

III. DISCHARGE INFORMATION

A. DISCHARGE LOCATION

The physical location of the outfall and the point designated for sampling are shown in the table below.

Outfall and Sampling Point Location

Outfall	Location				Receiving Stream
	General Location	Legal Description	Latitude	Longitude	
001 (physical location)	One mile south of the treatment plant	NW¼, NE¼, SE¼, Section 18, T8N, R2WIM, Cleveland Co., Oklahoma	N 35° 09' 58.99" (GPS: NAD-27 CONUS)	W 97° 26' 38.75" (GPS: NAD-27 CONUS)	Canadian River
Sampling Point	Approximately 200' south of the secondary clarifier #1	SW¼, SE¼, SE¼, Section 7, T8N, R2WIM, Cleveland Co., Oklahoma	---	---	To Outfall 001

B. DISCHARGE DESCRIPTION AND CHARACTERISTICS

Effluent characteristics are summarized below based on information provided in the application (Form 2M1), facility DMRs over the two year period of record (March 31, 2002, through March 31, 2004) and/or supplemental analytical laboratory reports. A quantitative and qualitative description of the discharge(s) described in DEQ Permit Application Form 2M1 is available for review upon request.

A summary of biomonitoring (whole effluent toxicity) testing data is provided in Section V.D.1.f.

1. Conventional and Non-conventional Pollutants

Data for conventional pollutants and for non-conventional pollutants present in the facility's effluent at measurable levels are summarized in the following table. Where a pollutant or effluent characteristic is limited or monitored on a seasonal basis, the data is summarized by season.

Conventional and Non-conventional Pollutants – Outfall 001

Pollutant or Effluent Characteristic	Season	Concentration (mg/l unless otherwise specified)			
		Daily Min.	Long Term Avg.	High Weekly Avg.	Daily Max.
Carbonaceous Biochemical Oxygen Demand, 5-day (CBOD ₅)	Apr – May	---	2.3	3.0	---
	Jun – Oct	---	2.0	4.0	---
	Nov – Mar	---	2.9	5.0	---
Total Suspended Solids (TSS)	Year round	---	5.2	26.0	---
Total Ammonia	Apr – May	---	0.6	2.6	---
	Jun – Oct	---	0.5	1.5	---
	Nov – Mar	---	1.6	8.0	---
Dissolved Oxygen (DO)	Year round	---	5.4	---	---
Total Dissolved Solids (TDS)	---	---	369	---	424
pH (std units)	---	6.6	---	---	7.8

2. Priority Pollutants

Data for priority pollutants present in the facility's effluent at measurable levels are summarized in the following table.

Priority Pollutants – Outfall 001

Effluent Characteristic	Concentration (µg/l unless otherwise specified)	
	Long Term Avg.	Daily Max.
Arsenic, total	4.35	4.35
Chromium, total	2.24	2.24
Copper, total	2.43	2.43
Lead, total	0.54	0.54
Nickel, total	1.38	1.38
Zinc, total	30.00	30.00

IV. TECHNOLOGY-BASED EFFLUENT LIMITATIONS AND CONDITIONS

POTWs treating domestic sewage are required by 40 CFR 133 to provide secondary or secondary-equivalent treatment. The Oklahoma definition of secondary treatment, which sets minimum requirements for developing wasteload allocations for municipalities in the state's Water Quality Management Plan (WQMP), is defined at OAC 252:606-5-2(a)(2). The definitions are dependent on the type of treatment system and whether receiving stream flow is perennial or intermittent. Since the City of Norman wastewater treatment facility is a mechanical plant discharging to a perennial stream, secondary treatment is defined according to OAC 252:606-5-2(a)(2)(B) as indicated below.

- 5-day Biochemical Oxygen Demand/Carbonaceous Biochemical Oxygen Demand (BOD₅/CBOD₅)
 - A monthly average effluent concentration of 30 mg/l BOD₅ (or CBOD₅ of 25 mg/l), and
 - A weekly average effluent concentration of 45 mg/l BOD₅ (or CBOD₅ of 40 mg/l), and
 - A monthly average percent removal for BOD₅ (or CBOD₅) of not less than 85%.
- Total Suspended Solids (TSS)
 - A monthly average effluent concentration of 30 mg/l TSS.
 - A weekly average effluent concentration of 45 mg/l TSS.
 - A monthly average percent removal for TSS of not less than 85%.
- A pH range between 6.5 and 9.0 standard units, inclusive.

For an influent wastestream composed primarily of domestic sewage, compliance with the 85% minimum monthly average percent removal criteria for BOD₅/CBOD₅ and TSS is implied if the effluent is in compliance with the concentration standards for secondary treatment.

V. WATER QUALITY-BASED EFFLUENT LIMITATIONS AND CONDITIONS

A. GENERAL

Section 101 of the Clean Water Act (CWA) states that "... it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited..." A permit containing technology-based permit limitations alone may not adequately protect the quality of a specific receiving stream. Thus, additional water quality-based effluent limitations and/or conditions are considered in the draft permit using narrative and numerical standards contained in the Oklahoma Water Quality Standards (OWQS), as amended (OAC 785:45), and implementation criteria contained in OACs 785:46 and 252:690, promulgated by the Oklahoma Water Resources Board (OWRB) and Department of Environmental Quality (DEQ), respectively. This is to ensure that no point-source discharge results in instream aquatic toxicity, a violation of applicable narrative or numerical State water quality standards, or aquatic bioaccumulation which threatens human health.

B. RECEIVING STREAM DESIGNATED USES AND ANTIDEGRADATION PROVISIONS

Outfall 001 discharges to the Canadian River (WBID 520610010010) in Segment 5206100 of the Canadian River Basin. As designated in Appendix A of the OWQS, the designated beneficial uses of the Canadian River in this segment are:

- Fish and Wildlife Propagation/Habitat Limited Aquatic Community (OAC 785:45-5-12);
- Agriculture (OAC 785:45-5-13);
- Industrial and Municipal Process and Cooling Water (OAC 785:45-5-15);

- Secondary Body Contact Recreation (OAC 785:45-5-17); and
- Aesthetics (OAC 785:45-5-19)

The Canadian River is not designated as an outstanding resource water (ORW), high quality water (HQW) or sensitive water supply (SWS) in Appendix A of the OWQS. Neither is it designated in Table 1 of Appendix B of the OWQS as an area of ecological and/or recreational significance or in Table 2 of Appendix B as an area containing federally-listed endangered species.

C. WATER QUALITY STANDARDS IMPLEMENTATION

1. Water Quality Standards Implementation Process

To achieve the objectives stated in Section V.A above, each pollutant present at measurable levels in the facility's effluent, for which there are one or more applicable numerical water quality criteria, is screened against the applicable criteria to determine whether the pollutant has reasonable potential (RP) to exceed any of the criteria. The screens are performed in accordance with the OWQS, OWQS implementation criteria in OAC 785:46 and OAC 252:690, and the Continuing Planning Process (CPP) document. In the RP screening process, the 95th percentile effluent concentration, or estimate thereof if the effluent data set is not sufficiently large to determine it directly, is used to compute an instream concentration according to the regulatory mixing zone equations defined in OAC 785:46. The computed instream concentrations are then compared with the applicable criteria to determine whether RP is exhibited. If RP is exhibited, in accordance with 40 CFR 122.44(d)(1)(vi) and OAC 252:690, a wasteload allocation and criterion long term average is computed for each applicable criterion. Water quality-based permit limitations are calculated for each pollutant exhibiting RP for all applicable criteria. The most stringent of the resulting monthly average permit limitations is established in the draft permit for each pollutant requiring such limitations.

2. Summary of Regulatory Parameters

Regulatory receiving water flows are established in OAC 785:46. Effluent regulatory flows, as well as regulatory effluent and background pollutant concentrations are established in OAC 252:690, Subchapter 3. Definitions and values for these terms are as follows:

a. Effluent and Upstream Receiving Water Regulatory Flows

- | | |
|--------------|---|
| $Q_{e(D)}$ | POTW design flow rate. The flow rate used must be consistent with that in the WQMP. The design flow rate specified in the permit application is 12.0 mgd, which is less than the 16.0 mgd allowed in the State Water Quality Management Plan (WQMP). |
| $Q_{u(7Q2)}$ | Upstream 7Q2 flow rate. This is the annual 7-day, 2-year low flow of the receiving stream. Where flow data published in the USGS publication, <u>Statistical Summary of Streamflow Records in Oklahoma Through 1999</u> (WRIR 02-4025), by R.L. Tortorelli, is available, minor adjustments for known upstream or downstream perennial flows, as appropriate, may be utilized to estimate the 7Q2 for a specific location upstream or downstream of the USGS gaging station. If streamflow is intermittent, if USGS 7Q2 data is not available, or if the applicant has not developed a site-specific 7Q2, a default value of 1 cfs (0.6463 mgd) is assumed. |
| $Q_{u(LTA)}$ | Upstream long-term average flow rate. This is the mean annual flow of the receiving stream. Where flow data published in the USGS publication, <u>Statistical Summary of Streamflow Records in Oklahoma Through 1999</u> (WRIR 02-4025), by R.L. Tortorelli, is available, minor adjustments for known upstream or downstream perennial flows, as |

appropriate, may be utilized to estimate the mean annual flow for a specific location upstream or downstream of the USGS gaging station. If published mean annual flow data is not available, it may be approximated by multiplying the receiving water's drainage area at the point of discharge by the mean annual runoff per unit area published in the CPP.

$Q_{u(STA)}$ Upstream short-term average flow rate. This flow rate, used only in the sample standard (SS) agriculture screen, is a function of $Q_{u(LTA)}$. The equation is $Q_{u(STA)} = 0.68 \times Q_{u(LTA)}$.

Upstream flows for this facility are based on published data for USGS gauging station 07229100, located 3.8 miles south of Noble on the Canadian River, or approximately 8 stream miles downstream of the City of Norman facility's point of discharge (POD). Because the gauging station is located downstream of the City of Norman facility and the Noble POTWs, $Q_{u(LTA)}$ is adjusted by subtracting the City of Norman and Noble POTWs' present average discharge flows and the mean annual runoff, between the City of Norman's facility POD and the gauging station, from the mean annual flow reported for the gauging station. The mean annual runoff is calculated by multiplying the mean annual runoff per unit area (0.2 cfs/mi² or 0.13 mgd/mi²) by the stream's drainage area between the gaging station and the POD (approximately 16 mi²).

Upstream Regulatory Flows (mgd)

Stream Flow	$Q_{u(7Q2)}$	$Q_{u(LTA)}$	$Q_{u(STA)}^a$
Canadian River at Station 07229100 (near Noble)	---	232.1	---
Mean annual runoff for portion of the Canadian River drainage basin between the gaging station and POD	---	Approximately 2.0	---
City of Norman facility's average discharge flow	---	Approximately 10.0	---
Noble POTWs's average discharge flows	---	Approximately 0.6	
Upstream flow at POD	2.6	220.0	149.6

^a $Q_{u(STA)} = 0.68 \times Q_{u(LTA)}$

b. Dilution Ratios (Q^*)

Q^* Ratio of effluent flow to stream flow, also known as dilution capacity. The Q^* ratios for municipal discharges, as well as their values, are defined in the following table.

Q^* Values – Outfall 001

Q* Ratio	Corresponding Water Quality Screens	Implementation Reference	Value
Q _{e(D)} / Q _{u(7Q2)}	Chronic Toxicity	OAC 252:690-3-53(a)(2)	4.61538
Q _{e(D)} / Q _{u(LTA)}	Human Health/Fish Flesh	OAC 252:690-3-66(b)	0.05455
	Human Health/Fish Flesh and Water	OAC 252:690-3-73(b)	
	Raw Water Column		
	Agriculture/Yearly Mean Std	OAC 252:690-3-81(a)(2)	
Q _{e(D)} / Q _{u(STA)}	Agriculture/Sample Std	OAC 252:690-3-81(b)(2)	0.08022

c. Characterization of Pollutant Effluent Concentrations

For purposes of determining whether water quality-based effluent limitations are required, one of two methods for determining C_{95} is employed, depending on the size of the effluent data set (i.e., number of data points). In accordance with OAC 252:690-3-90, where the effluent data set is comprised of fewer than 10 data points, a determination of whether further effluent monitoring of a pollutant is warranted in the absence of a requirement for effluent limitations by using the “TSD method.” The TSD method is based on the methodology in Section 3.3.2 of Technical Support Document for Water Quality-Based Toxics Control, EPA/505/2-90-001. The 95th percentile effluent concentration calculated using the TSD method is referred to as $C_{95(M)}$.

C_{95} 95th percentile maximum likelihood effluent concentration for purposes of determining whether effluent limitations are required.

In accordance with OAC 252:690-3-8, if at least 10 data points are available, at least five of which are measurable, C_{95} is calculated directly from the effluent data set, assuming a log-normal distribution, according to the following equation:

$$C_{95} = \text{EXP}(\ln(x)_{\text{avg}} + 1.645 \times s_{\ln(x)})$$

$$\text{where } \ln(x)_{\text{avg}} = \frac{\left(\sum_{i=1}^N \ln(x_i) \right)}{N} \text{ and } s_{\ln(x)} = \sqrt{\frac{N \sum_{i=1}^N (\ln(x_i))^2 - \left(\sum_{i=1}^N \ln(x_i) \right)^2}{N(N-1)}}.$$

In the above equations, $\ln(x)_{\text{avg}}$ represents the arithmetic average of the set of log-transformed data points, and $s_{\ln(x)}$ represents the standard deviation of the set of log-transformed data points.

If less than 10 effluent data points are available, C_{95} must be estimated from the mean effluent concentration, as follows:

$$C_{95} = C_{\text{mean}} \times 2.135, \text{ where } C_{\text{mean}} \text{ is calculated as the geometric mean.}$$

In accordance with OAC 252:690-3-5, if the geometric mean is not available or cannot be determined, the arithmetic mean may be used in the above equation.

$C_{95(M)}$ 95th percentile maximum likelihood effluent concentration for purposes of determining whether additional effluent monitoring is required, calculated using the “TSD method.” The TSD method is based on the methodology in Section 3.3.2 of Technical Support Document for Water Quality-Based Toxics Control, EPA/505/2-90-001.

$C_{95(M)}$ is calculated according to the following equation:

$$C_{95(M)} = C_{\text{max}} \times \text{RPF}_{95(M)}$$

$\text{RPF}_{95(M)}$ is calculated, assuming a log-normal distribution, according to the following equation:

$$RPF_{95(M)} = \frac{\text{EXP} \left(1.645 \sqrt{\ln(1 + CV^2)} - 0.5 \ln(1 + CV^2) \right)}{\text{EXP} \left(z_N \sqrt{\ln(1 + CV^2)} - 0.5 \ln(1 + CV^2) \right)}$$

where z_N is the upper k^{th} percentile of the normal distribution, $k = 0.05^{1/N}$ (for the 95% confidence level), and CV is assumed to equal 0.6.

The values of z_N and the resulting value of $RPF_{95(M)}$ for values of N from 1 to 9 are shown in the following table.

N	1	2	3	4	5	6	7	8	9
z_N	-1.645	-0.760	-0.336	-0.068	0.124	0.272	0.390	0.489	0.574
$RPF_{95(M)}$	6.199	3.795	3.000	2.585	2.324	2.141	2.006	1.898	1.811

CV

Relative variability of a data set. In accordance with OAC 252:690-3-7, CV is defined as the standard deviation of a data set divided by its arithmetic average. Where at least 10 effluent data points are available, CV may be determined according to the following equation.

$$CV = \frac{S_x}{C_{\text{avg}}}$$

Where fewer than 10 data points are available, a default CV value of 0.6 is assumed.

Values of C_{95} , $C_{95(M)}$ and CV are summarized for quantifiable pollutants with applicable water quality criteria in the following table.

C_{mean} , C_{max} , C_{95} , $C_{95(M)}$ and CV Values for Quantifiable Pollutants – Outfall 001

Effluent Characteristic	No. of Data Pts (N)	Concentration ($\mu\text{g/l}$ unless otherwise specified)				CV ^a
		C_{mean}	C_{95}	C_{max}	$C_{95(M)}$	
Arsenic, total	1	4.35	9.29	4.35	26.97	---
Chromium, total	1	2.24	4.78	2.24	13.89	---
Copper, total	1	2.43	5.19	2.43	15.06	---
Lead, total	1	0.54	1.15	0.54	3.35	---
Nickel, total	1	1.38	1.95	1.38	8.56	---
Zinc, total	1	30.00	64.05	30.00	185.97	---

^a A coefficient of variation (CV) is calculated only where an effluent data set consists of at least ten data points, of which at least five must be measurable. A CV value of 0.6 is assumed where a data set is of insufficient size to calculate a CV directly (see OAC 252:690-3-7).

d. Pollutant Background Concentrations

C_b

Upstream or background concentration of a pollutant. Specific data is used where available. Where such data is not available, and in streams where the $7Q2 = 0$ in the

absence of known upstream toxicants, background concentrations are assumed to be zero. Background levels are described in the following table.

Background Concentrations of Pollutants Present in Effluent – Outfall 001

Pollutant	No. of Data Pts (N)	Background Conc (C _b) (µg/l unless otherwise specified)	Data Source
Arsenic, total	---	Assumed zero ^a	---
Chromium, total	---	Assumed zero ^a	---
Copper, total	---	Assumed zero ^a	---
Lead, total	---	Assumed zero ^a	---
Nickel, total	---	Assumed zero ^a	---
Zinc, total	---	Assumed zero ^a	---

^a No background data available. Background level is assumed to be zero in accordance with OAC 252:690-3-11(c).

e. Other Applicable Terminology

C_{criterion} Numerical water quality criterion for a specific pollutant. For some pollutants, aquatic toxicity criteria are pH- or hardness-dependent. In such cases, in accordance with OAC 785:46-5-8, site-specific pH or hardness data, if available, may be used. If site-specific pH or hardness data is not available, the segment averaged pH or hardness from OAC 785:46, Appendix B, is used. Where a specific pollutant screen exhibits reasonable potential, C_{criterion} is used to calculate the wasteload allocation (WLA). Criteria applicable to Outfall 001 are as follows:

- Fish and wildlife propagation (F&WP/WWAC) use
 - C_A: Acute toxicity criterion
 - C_C: Chronic toxicity criterion
- Fish consumption use
 - C_{FF}: Human health criterion for the consumption of fish flesh
- Public and private water supply (PPWS) use
 - C_{RAW}: Raw water column criterion
 - C_{FFW}: Human health criterion for the consumption of fish flesh and water
- Agriculture use
 - C_{YMS}: Yearly mean standard
 - C_{SS}: Sample standard

C_d Instream concentration of a specific pollutant, according to the appropriate mixing equation.

D. WATER QUALITY-BASED REQUIREMENTS

1. Criteria for Protection of the Fish and Wildlife Propagation Use

a. DO and DO-Demanding Substances (Outfall 001)

OAC 785:45-5-12(f)(1) requires that where DO-demanding substances are present in an effluent at significant levels, a WLA must be established according to certain seasonal criteria dependent on the receiving water's aquatic community subcategory. In determining the WLA for DO-demanding substances, the prescribed level of secondary treatment for the facility (see Section IV) is modeled to determine if it meets the aforementioned seasonal criteria. If the model indicates that a more stringent WLA than secondary is required to meet these criteria, then the more stringent wasteload allocation (often referred to as a "tertiary" level of treatment) may be used once it is granted technical approval by EPA Region 6. It is then promulgated as an amendment to the state WQMP. The approved WLA for DO-demanding substances for this facility at a design flow of 12.0 mgd is shown in the following table.

DO-Based WLA (Outfall 001)

Season	Level of Treatment	WLA Parameters (in mg/l)			
		CBOD ₅	TSS	NH ₃ -N	DO
Spring (Apr 1 – May 31)	Tertiary	13	30	4.5	5
Summer (Jun 1 – Oct 31)	Tertiary	13	30	5	5
Winter (Nov 1 – Mar 31)	Secondary	30	30	^a	5

^a Secondary monthly average concentration for ammonia is defined as 12 mg/l.

For purposes of establishing permit limitations for DO-demanding substances, the seasonal monthly average limit (MAL) in the draft permit for each effluent characteristic is set equal to the corresponding WLA concentration shown in the table. The corresponding weekly average limit (WAL) is set equal to 1.5 times the seasonal WLA concentration in accordance with 40 CFR 122.45(d)(2).

b. pH (Outfall 001)

OAC 785:45-1-12(f)(3) states, "pH values shall be between 6.5 and 9.0 in waters designated for fish and wildlife propagation; unless pH values outside that range are due to natural conditions." This pH range is established in the draft permit.

c. Oil and Grease (Outfall 001)

OAC 785:45-5-12(f)(4) states, "All waters having the designated beneficial use of any subcategory of fish and wildlife propagation shall be maintained free of oil and grease to prevent a visible sheen of oil or globules of oil or grease on or in the water. Oil and grease shall not be present in quantities that adhere to stream banks and coat bottoms of water courses or which cause deleterious effects to the biota." A narrative condition prohibiting the discharge of any visible sheen of oil or globules of oil or grease will be included in the draft permit.

d. Toxicity from Halogenated Oxidants (Outfall 001)

OAC 785:46-3-1(d) states: "Toxicity from halogens (e.g., chlorine, bromine and bromochloro compounds) will be controlled by dehalogenation rather than WET testing. However, use of

dehalogenation shall not exempt an effluent from the WET testing requirements of this chapter.” Chapter 2, Part III of the CPP implements this narrative criteria as follows: “The requirement of OAC 785:46-3-1(d) for dehalogenation is typically implemented as “no measureable amount in the effluent.” “No measurable amount” is defined by the DEQ to be < 0.1 mg/l.

e. Ammonia Toxicity (Outfall 001)

(1) Criterion and Implementation

Interim implementation for controlling ammonia toxicity is described in OAC 785:46 and OAC 252:690. OAC 785:46-5-3(b)(5) states, “For regulatory purposes, there is a reasonable potential for chronic toxicity if concentrations of ammonia outside the chronic regulatory mixing zone exceed 6 mg/l.” For POTWs, OAC 252:690-3-20 through 3-23 requires that where seasonal DO-based monthly average ammonia limits are established, those limits must be compared with toxicity-based monthly average ammonia limits determined using the interim 6 mg/l chronic toxicity criterion, the conservative substance mixing zone equations for chronic toxicity, and a monitoring frequency of 3/week.

(2) Determination of Toxicity-Based Limits

Toxicity-based ammonia limits are determined in accordance with OAC 252:690-3-22.

(a) Wasteload Allocation and Criterion Long Term Average Concentration

C_C for ammonia is 6 mg/l and C_b is assumed to be zero. The chronic toxicity wasteload allocation equations for ammonia are as follows:

$$WLA_{NH_3} = 6 \left(\frac{1 + Q^*}{1.94 Q^*} \right), \text{ for } Q^* \leq 0.1823.$$

$$WLA_{NH_3} = 6 (6.17 - 15.51 Q^*), \text{ for } 0.1823 < Q^* < 0.3333.$$

$$WLA_{NH_3} = 6 \text{ mg/l}, \text{ for } Q^* \geq 0.3333.$$

Q^* for this application is 4.62; therefore, the third equation is used. Thus, $WLA_{NH_3} = 6$ mg/l. WLA_{NH_3} is a short term value and must be converted to a long term average for development of permit limits. LTA_{NH_3-N} is calculated on a 99% probability basis, and the equation is as follows:

$$LTA_{NH_3} = WLA_{NH_3} \times \exp \left(0.5 \ln \left(1 + \frac{CV^2}{4} \right) - 2.326 \left(\ln \left(1 + \frac{CV^2}{4} \right) \right)^{0.5} \right),$$

where a CV value of 0.6 is assumed. Thus, $LTA_{NH_3} = 3.16$ mg/l.

(b) Permit Limits

The toxicity-based monthly average limit (MAL_{NH_3}) is calculated on a 95% probability basis, and the daily maximum limit (DML_{NH_3}) is calculated on a 99% probability basis. The monitoring frequency basis is 3/week (or 12/month). The limits equations are as follows:

$$MAL_{NH_3} = LTA_{NH_3} \times \text{EXP} \left(1.645 \left(\ln \left(1 + \frac{CV^2}{N_m} \right) \right)^{0.5} - 0.5 \ln \left(1 + \frac{CV^2}{N_m} \right) \right),$$

where N_m is the per month monitoring frequency.

Thus, based on $N_m = 12$, $MAL_{NH_3} = 4.1$ mg/l.

$$DML_{NH_3} = LTA_{NH_3} \times \text{EXP} \left(2.326 \left(\ln \left(1 + CV^2 \right) \right)^{0.5} - 0.5 \ln \left(1 + CV^2 \right) \right)$$

Thus, $DML_{NH_3} = 9.9$ mg/l.

(3) Comparison of Toxicity-Based Ammonia Limits with DO-Based Ammonia Limits

In accordance with OAC 252:690-3-23, the most stringent monthly average limit for each season and its associated weekly average or daily maximum limit, as appropriate, is established in the permit.

Comparison of Ammonia Limits (mg/l)

Type of Limit	Spring (Apr 1 – May 31)			Summer (Jun 1 – Oct 31)			Winter (Nov 1 – Mar 31)		
	Monthly Avg	Weekly Avg	Daily Max	Monthly Avg	Weekly Avg	Daily Max	Monthly Avg	Weekly Avg	Daily Max
DO-Based	4.5	6.8	---	5	7.5	---	12	18	---
Toxicity-Based	4.1	---	9.9	4.1	---	9.9	4.1	---	9.9
Draft Permit	4.1	---	9.9	4.1	---	9.9	4.1	---	9.9

Since toxicity-based ammonia limits are more stringent in all seasons, they are recommended. It is apparent from an examination of the historical ammonia levels described in Section III.B.1 that the POTW would be able to consistently comply with the prescribed toxicity-based ammonia limits during all seasons. Therefore, compliance with the new toxicity-based ammonia limits for all seasons will take effect on the effective date of the permit.

(4) Reevaluation of Toxicity-Based Ammonia Limits

In accordance with OAC 252:690-3-25, the draft permit will include a provision for concurrent testing of ammonia and pH on all composite samples collected for WET testing of the Fathead minnow species (see Section V.D.1.f(4)(e)). The facility may request facility-specific toxicity-based ammonia limits if it is able to provide supporting evidence through continued concurrent testing that a significant correlation exists between WET test results and ammonia levels, and that ammonia levels consistently exceeding the above toxicity-based limits do not result in significant lethal or sublethal effects to either WET test species.

(5) Performance-Based Ammonia Monitoring Frequency Reduction

In accordance with OAC 252:690-3-26, the facility may request a seasonal performance-based monitoring frequency reduction from 3/week to 1/week by certifying that the highest daily maximum reported during the first year of the permit is no greater than 1.5 times the toxicity-based MAL concentration (or 6.15 mg/l).

f. Whole Effluent Toxicity (Outfall 001)

(1) Criterion and Implementation

Whole effluent toxicity (WET) testing is the most direct measure of potential aquatic toxicity, since it incorporates the effects of synergism of effluent components and receiving stream water quality characteristics. OAC 785:45-5-12(f)(6)(A) states, "Surface waters of the state shall not exhibit acute toxicity and shall not exhibit chronic toxicity outside the [chronic] mixing zone. Acute test failure and chronic test failure shall be used to determine discharger compliance with these narrative aquatic life toxics criteria." This narrative toxicity criterion is implemented according to procedures described at OAC 785:46, Subchapter 3, OAC. 252:690-3-17 through 3-43, and Chapter 3 of the CPP.

Two types of WET tests are used to implement the narrative toxicity criterion. The 48-hour acute test is used to protect against acute toxicity, and the 7-day chronic test is used to protect against chronic toxicity outside the chronic regulatory mixing zone. Two test species are used. The vertebrate species is *Pimephales promelas* (Fathead minnow), and the invertebrate species is *Daphia pulex* (for acute testing) or *Ceriodaphnia dubia* (for chronic testing).

(2) WET Testing Historical Summary

The previous permit contained a Diazinon alternative to WET limits for *Ceriodaphnia dubia* (biomonitoring on a 1/month basis during the period from April to September and a quarterly basis during the period from October to March) and standard biomonitoring requirements for *Pimephales promelas* (biomonitoring on a semi-annual basis). The critical dilution was 100% and a 0.75 dilution series was used. Under the previous permit, only lethal effects were considered in terms of test failure. OAC 252:690-3-40(b) now requires that significant sublethal effects at or below the critical dilution also be considered as test failures. In the following summary table, where a test failed, or would have failed under current test failure criteria, the No Observed Effect (NOEC) concentrations (NOEC_L for lethal effects and NOEC_S for sublethal effects) are shown **underlined in bold face**.

**Summary of Chronic WET Test Results by Species
March 1999 through March 2004**

Ceriodaphnia dubia						Pimephales promelas (Fathead minnow)		
April – September (1/month)			October – March (1/quarter)			Year round (1/6 months)		
Reporting Period	NOEC _L ^a	NOEC _S ^a	Reporting Period	NOEC _L ^a	NOEC _S ^a	Reporting Period	NOEC _L ^a	NOEC _S ^a
04/99	100	100	03/99	100	<u>75</u>	12/00	100	<u>75</u>
05/99	<u>75</u>	<u>75</u>	12/99	<u>75</u>	<u>42</u>	06/01	100	100
06/99	<u>56</u>	<u>56</u>	03/00	100	100	12/01	100	100
07/99	100	100	12/00	100	100	06/02	100	100
08/99	<u>75</u>	<u>56</u>	03/01	100	100	12/02	100	100
09/99	100	100	12/01	100	100	06/03	100	<u>32</u>
04/00	100	100	03/02	100	100	12/03	100	<u>75</u>
05/00	100	100	12/02	100	100	01/04	100	<u>75</u>
06/00	100	<u>75</u>	03/03	100	100			
07/00	100	100	12/03	100	100			
08/00	100	100	03/04	100	100			
09/00	100	100						
04/01	<u>75</u>	<u>75</u>						
05/01	<u>56</u>	<u>56</u>						
06/01	100	100						
07/01	100	100						
08/01	100	100						
09/01	100	100						
04/02	100	100						
05/02	100	100						
06/02	100	100						
07/02	100	100						
08/02	100	100						
09/02	100	100						
04/03	100	100						
05/03	<u>75</u>	<u>75</u>						
06/03	100	100						
07/03	100	100						
08/03	100	100						
09/03	100	100						

^a NOECs reported in percent effluent.

(3) Reasonable Potential

For the *Ceriodaphnia dubia* species, the above summary shows lethality and sublethality on seven and nine occasions, respectively. For the *Pimephales promelas* species, four sublethalities are shown. This clearly shows a consistent and continuing pattern of both intermittent lethality and persistent sublethal toxicity and demonstrates reasonable potential to exceed the narrative toxicity criterion. The facility has conducted two Toxicity Reduction Evaluations (TRE); however, chemical-specific causes for lethal effect toxicity cannot be established through the TREs. Thus, a WET limit is established in the draft permit for the *C. dubia* species, which will become effective on the effective date of the permit. The facility is required to continue conducting WET testing and monitoring for the *Pimephales promelas* species; however, there will no WET limit for *P. promelas* at this time.

(4) Whole Effluent Toxicity Testing Requirements

(a) Type of WET Testing Required

In accordance with OAC 252:690-3-31, the type of WET test(s) required is based on the value of Q^* , as follows:

- Where $Q^* < 0.054$, acute testing only is required.
- Where $Q^* > 0.3333$, chronic testing only is required.
- Where $0.054 \leq Q^* \leq 0.3333$, both acute and chronic testing are required.

Since Q^* is 4.62, only chronic testing is required.

(b) Critical Dilutions

The chronic critical dilution (CCD), expressed as percent effluent, is based on the value of Q^* using the following set of equations:

$$CCD = 100 \times \frac{1.94 Q^*}{(1 + Q^*)}, \text{ where } Q^* \leq 0.1823.$$

$$CCD = 100 \times \frac{1}{(6.17 - 15.51 Q^*)}, \text{ where } 0.1823 < Q^* < 0.3333.$$

$$CCD = 100, \text{ where } Q^* \geq 0.3333.$$

Since Q^* for this application is ≥ 0.3333 , the third equation is used, and the CCD is 100%.

(c) Dilution Series

A 0.75 dilution series is used for all WET testing. Where it is practical to do so, the critical dilution is bracketed. The purpose of doing so is to evaluate dose response both above and below the critical dilution. For critical dilutions between 76% and 95%, OAC 252:690, Appendix D, Table D-2, requires that a 100% effluent dilution be added to the dilution series to

bracket the critical dilution. In accordance with OAC 252:690-3-33, the dilution series for each type test are as follows (critical dilutions are shown **underlined in bold face**):

- Chronic test: **100%**, 75%, 56%, 42%, 32%, plus a dilution water control.

(d) Frequency of WET Testing

In accordance with OAC 252:690-3-41, the permittee will be required to perform quarterly testing of both test species. As discussed above, the facility's WET testing historical summary shows a consistent and continuing pattern of both intermittent lethality and persistent sublethality on both species, respectively; therefore, the facility is required to perform quarterly testing of both species for the life of the permit.

(e) Concurrent Testing Requirements

Concurrent testing of total ammonia and pH will be required on all composite samples collected for Fathead minnow testing. The draft permit will not specify any concurrent testing requirements for daphnid testing.

2. Aquatic Toxicity, Human Health and Raw Water Column Criteria for Toxic Substances for Protection of the Fish and Wildlife Propagation, Fish Consumption and Public and Private Water Supply Uses

a. Criteria and Implementation

(1) Aquatic Toxicity– Fish and Wildlife Propagation Use

Acute and chronic aquatic toxicity numerical criteria are specified at OAC 785:45-5-12(f)(6)(G) and are implemented according to procedures in OAC 785:46, Subchapter 5, OAC. 252:690-3-51 through 3-57, and Chapter 3 of the CPP.

Aquatic toxicity numerical criteria are hardness-dependent for certain metals. The equations for calculating hardness-dependent criteria (for those metals present at quantifiable levels in the combined discharge) and the resulting acute and chronic criteria are as follows:

Hardness-dependent Aquatic Toxicity Criteria for the Canadian River

Effluent Characteristic	Acute Toxicity Criteria		Chronic Toxicity Criteria	
	Equation	Value ^a	Equation	Value ^a
Arsenic, total	---	360.00	---	190.00
Chromium, total	---	---	---	50.00
Copper, total	$C_{\text{acute}} = e^{(0.9422 (\ln (\text{hardness})) - 1.3844)}$	77.85	$C_{\text{chronic}} = e^{(0.8545 (\ln (\text{hardness})) - 1.386)}$	45.56
Lead, total	$C_{\text{acute}} = e^{(1.273 (\ln (\text{hardness})) - 1.46)}$	541.44	$C_{\text{chronic}} = e^{(1.273 (\ln (\text{hardness})) - 4.705)}$	21.10
Nickel, total	$C_{\text{acute}} = e^{(0.846 (\ln (\text{hardness})) + 3.3612)}$	4986.29	$C_{\text{chronic}} = e^{(0.846 (\ln (\text{hardness})) + 1.1645)}$	554.32
Zinc, total	$C_{\text{acute}} = e^{(0.8473 (\ln (\text{hardness})) + 0.8604)}$	412.22	$C_{\text{chronic}} = e^{(0.8473 (\ln (\text{hardness})) + 0.7614)}$	373.37

^a Based on a segment-averaged receiving water hardness of 442 mg/l.

(2) Protection of Human Health – Fish Consumption Use

Criteria for the protection of human health for the consumption of fish flesh apply only to receiving waters not designated as habitat-limited aquatic communities. Since the receiving water is designated as a habitat-limited aquatic community, no additional permit action is needed to protect the fish consumption beneficial use.

(3) Protection of Raw Water Column and Human Health – Public and Private Water Supply Use

OWQS raw water column criteria and criteria for the protection of human health for the consumption of fish flesh and water are specified at OAC 785:45-5-10(1) and 785:45-5-10(6), respectively, and are implemented according to the procedures in OAC 785:46, Subchapter 7, OAC 252:690-3-71 through 3-77, and chapter 3 of the CPP. These criteria apply only to receiving waters specifically designated in OAC 785:45, Appendix A, for the Public and Private Water Supply (PPWS) use. Since no PPWS use is designated to the receiving water, no additional permit action is needed.

b. Determination of Reasonable Potential and Wasteload Allocation

(1) Reasonable Potential and WLA Equations

(a) Aquatic Toxicity– Fish and Wildlife Propagation Use (Outfall 001)

For determining whether there is reasonable potential to exceed acute toxicity numerical criteria for discharges to streams, OAC 785:46-5-3(b)(2) defines a pollutant's concentration at the edge of the acute regulatory mixing zone (C_d) as:

$$C_d = C_b + \frac{Q_{e(D)}}{64.63} (C_{95} - C_b), \text{ where } Q_{e(D)} \text{ is expressed in mgd.}$$

In order for the acute mixing zone equation to be mathematically well-behaved, i.e., for C_d to fall in the range between C_u and C_{95} , the value for $Q_{e(D)}$ used in the equation must be less than or equal to 64.63 mgd. If the actual $Q_{e(D)} > 64.63$ mgd, a value of 64.63 mgd is used in the reasonable potential equation.

Should a pollutant's acute toxicity screen exhibit reasonable potential, a water quality-based limit is required for that pollutant and a wasteload allocation is calculated for each applicable criterion. For discharges to streams, the acute toxicity wasteload allocation is calculated in accordance with OAC 252:690-3-55(a)(1), as follows:

$$WLA_A = C_b + \frac{64.63}{Q_{e(D)}} (C_A - C_b), \text{ where } Q_{e(D)} \text{ is expressed in mgd.}$$

As with the reasonable potential equation, if the actual $Q_{e(D)} > 64.63$ mgd, a value of 64.63 mgd is used in the WLA equation.

For determining whether there is reasonable potential to exceed chronic toxicity numerical criteria, OAC 785:46-5-3(b)(2) defines a pollutant's maximum concentration at the boundary of the chronic regulatory mixing zone (C_d) as:

$$C_d = C_u + 1.94 Q^* \frac{(C_{95} - C_u)}{(1 + Q^*)}, \text{ for } Q^* \leq 0.1823$$

$$C_d = C_u + \frac{(C_{95} - C_u)}{(6.17 - 15.51 Q^*)}, \text{ for } 0.1823 < Q^* < 0.3333$$

$$C_d = C_{95}, \text{ for } Q^* \geq 0.3333$$

Should a pollutant's chronic toxicity screen exhibit reasonable potential, a water quality-based limit is required for that pollutant and a wasteload allocation is calculated for each applicable criterion. For discharges to streams, the chronic toxicity wasteload allocation is calculated in accordance with OAC 252:690-3-55(a)(1), as follows:

$$WLA_C = C_u + \left(\frac{1 + Q^*}{1.94 Q^*} \right) (C_C - C_u), \text{ for } Q^* \leq 0.1823$$

$$WLA_C = C_u + (6.17 - 15.51 Q^*) (C_C - C_u), \text{ for } 0.1823 < Q^* < 0.3333$$

$$WLA_C = C_C, \text{ for } Q^* \geq 0.3333$$

(2) Results of Reasonable Potential Screening

Aquatic Toxicity– Fish and Wildlife Propagation Use (Outfall 001)

Results of the acute and chronic toxicity screens for Outfall 001, using $Q_{e(D)} = 12.0$ mgd, C_{95} values reflected in Section V.C.2.c, pollutant background levels reflected in Section V.C.2.d, and any hardness-dependent metals criteria reflected in Section V.D.2.a(1), show in the following table. Any required WLAs are also shown.

Results of Acute and Chronic Toxicity Screens (Outfall 001)
(concentrations in $\mu\text{g/l}$ unless otherwise specified)

Effluent Characteristic	Acute Toxicity				Chronic Toxicity			
	C_d	C_A	$C_d > C_A?$	WLA_A	C_d	C_C	$C_d > C_C?$	WLA_C
Arsenic, total	1.72	360.00	No	---	9.29	190.00	No	---
Chromium, total	---	---	---	---	4.78	50.00	No	---
Copper, total	0.96	77.85	No	---	5.19	45.56	No	---
Lead, total	0.21	541.44	No	---	1.15	21.10	No	---
Nickel, total	0.55	4986.29	No	---	2.95	554.32	No	---
Zinc, total	11.89	412.22	No	---	64.05	373.37	No	---

c. Criterion Long Term Average (LTA) Concentration

Since none of the pollutants shows reasonable potential to exceed State's water quality standards and no WLA was determined, calculation of LTA is not needed.

d. Permit Limitations

Since none of the priority pollutants shows reasonable potential to exceed State's water quality standards, permit limits for priority pollutants are not needed.

3. Mineral Constituent Criteria for Protection of the Agriculture Use (Outfall 001)

The receiving stream to which the facility discharges is on the newly approved State's 303 (d) list as an impaired waterbody for total dissolved solids (TDS). However, high levels of TDS, chloride, and sulfate, are typically not characteristics of municipal POTW discharges as evident by low effluent concentrations of TDS reported (shown previously) by the facility; therefore, it is not expected that the discharge from this facility will exceed criteria for these parameters. Therefore, permit action to protect this beneficial use is not needed.

4. Bacterial Criteria for Protection of the Primary Body Contact Recreation and Public and Private Water Supply Uses

Not applicable since neither the Primary Body Contact Recreation nor the Public and Private Water Supply beneficial uses are designated to the receiving water.

5. Criteria for Protection of the Aesthetics Use (Outfall 001)

a. General

Nutrient loading in Oklahoma's surface waters, particularly of phosphorus, has become an area of concern. OAC 785:45-5-19(c)(2) states, "Nutrients from point source discharges or other sources shall not cause excessive growth of periphyton, phytoplankton, or aquatic macrophyte communities which impairs any existing or designated beneficial use." This narrative criteria is echoed in the State's general antidegradation policy as applied to beneficial uses (OAC 785:45-3-2(c)), "No water quality degradation which will interfere with the attainment or maintenance of an existing or designated beneficial use shall be allowed."

b. Nutrient Limitations and Monitoring Requirements

The previous permit for the City of Norman contained no nitrate or phosphorus limits nor reporting requirements. According to data published by the OWRB in its Beneficial Use Monitoring Program (BUMP) 2003 Final Report, the trophic states of the Canadian River upstream and downstream of the City of Norman discharge are stable. Thus, in the judgement of the permit writer, monitoring of effluent nutrient levels is not warranted at this time. The permit will, however, contain a narrative condition for control of solids and nutrients to protect the Aesthetics use.

E. MONITORING REQUIREMENTS

1. Effluent Monitoring Requirements (Outfall 001)

a. General

In accordance with OAC 252:690-3-90, where reasonable potential to exceed an applicable criterion is not exhibited, the background is unknown and there are fewer than 10 effluent data points to characterize the effluent, further effluent monitoring may be warranted based on use of the TSD

method for computing $C_{95(M)}$ (see Section V.C.2.C). The TSD procedure accounts for the inherent uncertainty in characterizing an effluent distribution from a small data set.

b. Applicability

All pollutants detectable in the discharge which have state water quality criteria are screened for reasonable potential using $C_{95(M)}$ in place of C_{95} to determine which of them may require effluent monitoring. The same reasonable potential equations as described in sections V.D.2 are used.

c. Results of Reasonable Potential Screening Using $C_{95(M)}$

Where C_d , calculated using $C_{95(M)}$ in place of C_{95} , exceeds an applicable criterion for a pollutant, a short term effluent monitoring requirement (sufficient to collect a minimum of ten data points) is established in the permit for that pollutant in accordance with OAC 252:690-3-90(a). Reasonable potential may then be reassessed with the larger effluent data set and the permit reopened, if necessary, to add appropriate effluent limitations. Results of the reasonable potential screens using $C_{95(M)}$ are shown in the following tables.

(1) Aquatic Toxicity Criteria

Results of Acute and Chronic Toxicity RP Screens using $C_{95(M)}$ (Outfall 001)
(concentrations in $\mu\text{g/l}$ unless otherwise specified)

Effluent Characteristic	Acute Toxicity			Chronic Toxicity		
	C_d	C_{acute}	$C_d > C_{acute}?$	C_d	$C_{chronic}$	$C_d > C_{chronic}?$
Arsenic, total	5.01	360.00	No	26.97	190.00	No
Chromium, total	---	---	---	13.89	50.00	No
Copper, total	2.80	77.85	No	15.06	45.56	No
Nickel, total	6.22	541.44	No	3.35	21.10	No
Lead, total	1.59	4986.29	No	8.56	554.32	No
Zinc, total	34.53	412.22	No	185.97	337.37	No

(2) Human Health/Fish Flesh Criteria

Not applicable.

(3) Raw Water Column and Human Health/Fish Flesh and Water Criteria

None.

(4) YMS and SS Agriculture Criteria

None.

2. Background Monitoring Requirements (Monitoring Point 999)

OAC 252:690-3-10 requires that, where available, background levels be included in reasonable potential assessments and in calculating wasteload allocations.

a. Assessment for Aquatic Toxicity, Human Health and Raw Water Column Criteria

In general, if water quality-based limits derived from aquatic toxicity, human health or raw water column criteria are established in a permit for a pollutant based on an assumed zero background (or a partial background data set consisting of less than 10 data points), background monitoring for that pollutant will be required. There are two exceptions to this requirement, both of which exclude background concentration as a component in the wasteload allocation equation. These exceptions are as follows:

- where permit limits are based on a chronic toxicity criterion in an effluent-dominated discharge situation, and
- where permit limits are based on a raw water column or human health/fish flesh and water criterion and the associated wasteload allocation was set equal to that criterion because the discharge is in close proximity to a PWS intake (not applicable to this facility).

Where permit limits for a pollutant are not required and the background is unknown (assumed zero), background monitoring may be justified for the purpose of reassessing whether there is reasonable potential to exceed an applicable criterion. In such cases, OAC 252:690-3-12 requires that the background trigger to criterion (BT/C) ratio be used to determine whether background monitoring is warranted for a pollutant. The trigger background concentration for a criterion is defined in OAC 252:690-1-2 as “the background concentration necessary to trigger reasonable potential for a substance to exceed an applicable criterion given a specified mean effluent concentration.” As described in Appendix J of OAC 252:690, the procedure involves calculating a BT/C ratio for each applicable criterion and comparing each such ratio with an associated threshold value, $(BT/C)_{max}$, which is a function of the magnitude of each criterion. Where the BT/C ratio > 1.0 , the C_{95} concentration is less than the criterion and there is no possibility of exhibiting reasonable potential to exceed that criterion at any background level which is less than or equal to the criterion. Where the BT/C ratio ≤ 1.0 , the C_{95} concentration is at least as high as the criterion and, depending on the magnitude of the criterion, background monitoring may be justified. If the BT/C ratio $\leq (BT/C)_{max}$ for any of the applicable criteria for a pollutant, then background monitoring for that pollutant is required. In order for $(BT/C)_{max}$ to be appropriately more sensitive to criteria of smaller magnitude, at which a measurable background level of a pollutant may have a relatively greater impact in the determination of reasonable potential, the value of the $(BT/C)_{max}$ threshold value function increases as the magnitude of a criterion decreases within the range of 1 to 1000 $\mu\text{g/l}$.

(1) Calculation of $(BT/C)_{max}$

The value of $(BT/C)_{max}$ for each applicable criterion is an inverse function of the criterion’s magnitude with two break points (or “hinges”), one at 1 $\mu\text{g/l}$ and the other at 1000 $\mu\text{g/l}$. It is calculated as follows:

$$(BT/C)_{max} = 1.0, \text{ where the criterion} \leq 1.0 \mu\text{g/l.}$$

$$(BT/C)_{max} = \frac{1}{2^{\log(\text{criterion})}}, \text{ where the criterion} > 1.0 \mu\text{g/l and} \leq 1000 \mu\text{g/l.}$$

$$(BT/C)_{max} = 0.125, \text{ where the criterion} > 1000 \mu\text{g/l.}$$

(2) Calculation of BT/C Ratios

Background trigger concentrations are first calculated for all applicable criteria and the BT/C concentration is then calculated by dividing the criterion-specific background trigger concentration by the applicable criterion. Values of $Q_{e(D)}$, Q^* , C_{95} , C_A , C_C , C_{FF} , C_{FFW} , and C_{Raw} are as previously defined.

(a) Acute Toxicity Criteria

$$BT/C_{Acute} = \frac{\left(\frac{64.63 C_A - Q_{e(D)} C_{95}}{64.63 - Q_{e(D)}} \right)}{C_A}, \text{ where } Q_{e(D)} < 64.63 \text{ mgd.}$$

BT/C_{Acute} is not defined for values of $Q_{e(D)} \geq 64.63$ mgd.

(b) Chronic Toxicity Criteria

For discharges to streams, the following equations are used:

$$\bullet \quad BT/C_{Chronic} = \frac{\left(\frac{(1 + Q^*)C_C - 1.94 Q_{e(D)} C_{95}}{1 - 0.94 Q^*} \right)}{C_C}, \text{ where } Q^* \leq 0.1823$$

$$\bullet \quad BT/C_{Chronic} = \frac{\left(\frac{(6.17 - 15.51 Q^*)C_C - C_{95}}{5.17 - 15.51 Q^*} \right)}{C_C}, \text{ where } 0.1823 < Q^* < 0.3333$$

- $BT/C_{Chronic}$ is not defined for $Q^* \geq 0.3333$ (effluent-dominated discharge situations), since the background level is not a component of the chronic toxicity reasonable potential equation.

(c) Human Health/Fish Flesh Criteria

$$BT/C_{FF} = \frac{(1 + Q^*)C_{FF} - Q^* C_{95}}{C_{FF}}$$

(d) Raw Water Column Criteria

$$BT/C_{Raw} = \frac{(1 + Q^*)C_{Raw} - Q^* C_{95}}{C_{Raw}}$$

(e) Human Health/Fish Flesh and Water Criteria

$$BT/C_{FFW} = \frac{(1 + Q^*)C_{FFW} - Q^*C_{95}}{C_{FFW}}$$

(3) Summary of Background Monitoring Requirements

Summary of Background Monitoring Requirements (Outfall 001)

Effluent Characteristic	Effluent limit required? ^a	Background assumed zero? ^b	BT/C ratio procedure applicable?	BT/C Ratio Assessment				Background monitoring required?
				Type Criterion	BT/C Ratio	(BT/C) _{max}	BT/C ratio ≤ (BT/C) _{max} ?	
Arsenic, total	No	Yes	Yes	Acute	>1	0.17	No	No
				Chronic	NA	0.21	NA	
				FF	NA	NA	NA	
Chromium, total	No	Yes	Yes	Acute	NA	NA	NA	No
				Chronic	NA	0.31	NA	
				FF	NA	NA	NA	
Copper, total	No	Yes	Yes	Acute	>1	0.27	No	No
				Chronic	NA	0.32	NA	
				FF	---	---	---	
Lead, total	No	Yes	Yes	Acute	>1	0.15	No	No
				Chronic	NA	0.40	NA	
				FF	NA	NA	NA	
Nickel, total	No	Yes	Yes	Acute	>1	0.13	No	No
				Chronic	NA	0.15	NA	
				FF	NA	NA	NA	
Zinc, total	No	Yes	Yes	Acute	>1	0.16	No	No
				Chronic	NA	0.17	NA	
				FF	---	---	---	

b. Agriculture Criteria

None.

F. 303(d) LIST

1. Water Quality Assessment and Causes of Impairment

The 2002 edition of the State's 303(d) list indicates that the segment of Canadian River to which the City of Norman facility discharges (waterbody ID 520610010010) is impaired. The listed causes are pathogens, total dissolved solids, turbidity, and pH. A TMDL for this segment of the Canadian River is scheduled for 2005.

2. 303(d) List-Related Permitting Actions

a. Pathogens

Although the segment of the Canadian River to which the City of Norman facility discharges is listed as an impaired waterbody for pathogens, neither the Primary Body Contact Recreation nor the Public

and Private Water Supply beneficial uses are designated. Coliform standards do not apply and there is no reasonable potential for the discharge to cause or contribute to violation of water quality standards. Therefore, additional monitoring and reporting requirements are not needed.

b. Total Dissolved Solids

Although the segment of the Canadian River to which the facility discharges is listed as an impaired waterbody for total dissolved solids, the facility's average end-of pipe effluent concentration of 369 mg/l (maximum of 424 mg/l) is much lower than the mean TDS concentrations reported in the 2003 BUMP Report for the Canadian River upstream (mean concentration of 1035.3 mg/l) and downstream (mean concentration greater than 750 mg/l) from the facility's point of discharge; therefore, there is no reasonable potential for the discharge to cause or contribute to a violation of water quality standards. Thus, no limits or monitoring requirements are needed at this time.

c. Turbidity

Turbidity is controlled by the effluent limitations on total suspended solids. Therefore, additional monitoring and reporting requirements are not needed.

d. pH

pH is controlled by the effluent limitations on pH. Therefore, additional monitoring and reporting requirements are not needed.

e. Reopener clause

A reopener clause is provided in the permit for the purpose of incorporating provisions of the TMDL after it is completed and approved.

G. ANTIDEGRADATION REQUIREMENTS

Because no antidegradation restrictions are listed in Appendix A of the OWQS for the segment of the Canadian River to which the City of Norman wastewater treatment facility discharges (see Section V.B), implementation of the state's antidegradation policy, as described at OAC 785:46, Suchapter 13, states that no special requirements beyond Tier 1 protection (maintenance and protection of designated uses, as herein described) is necessary.

H. PROTECTION OF ENDANGERED AND THREATENED SPECIES AND CRITICAL HABITAT

The segment of the Canadian River to which the City of Norman wastewater treatment facility discharges is considered by the U.S. Fish and Wildlife Service (USFWS) to be a sensitive area for endangered or threatened species. Since there is no proposed increase in the plant design flow or change in the point of discharge, no adverse impact on endangered or threatened species or their critical habitat is expected.

VI. GROUNDWATER PROTECTION

For municipal facilities, permits issued through the Water Quality Division's Construction Permit Section for plant design and construction (pursuant to the requirements OAC 252:656) and land application of non-industrial wastewater and/or biosolids (pursuant to the requirements of OAC 252:621 and OAC 252:606, respectively) are considered sufficient to protect groundwater quality.

VII. DRAFT PERMIT EFFLUENT LIMITATIONS

A. GENERAL

In accordance with 40 CFR 122.44(a), (d) and (l), pollutant limitations and monitoring requirements are established in the draft permit based on the more stringent of technology-based, water quality-based or previous permit requirements. Both concentration and mass (loading) limits are established unless it is impractical to specify loading limits because of the units in which concentration limits are expressed (e.g., standard units for pH). Such loading limitations are calculated using the facility's design flow according to the following equation:

$$\text{Mass loading limit (in lb/day)} = \text{Conc limit (in mg/l)} \times Q_{e(D)} \text{ (in MGD)} \times 8.34$$

The facility's approved design flow of 12.0 mgd is used to calculate all loading limits.

B. EFFLUENT LIMITATIONS

The following limitations and monitoring requirements for Outfall 001 apply for the periods indicated. Based on the effluent analytical data provided with the permit application, the facility appears to be able to comply with all newly established limits.

Mass Loading Limitations and Reporting Requirements (Outfall 001)

Effluent Characteristic ^a		Water Quality Standards Basis	Previous Permit Basis	Draft Permit
		Monthly Avg.	Monthly Avg.	Monthly Avg.
Flow (mgd)		Report	Report	Report
CBOD ₅	Apr – May	1301.0	1301.0	1301.0
	Jun – Oct	1301.0	1301.0	1301.0
	Nov – Mar	2502.0	2502.0	2502.0
TSS	Year round	3002.4	3002.4	3002.4
Ammonia, total	Year round	410.3	410.3	410.3

^a Units are lb/day, unless otherwise specified.

Concentration Limitations and Reporting Requirements (Outfall 001)

Effluent Characteristic ^a		Water Quality Standards Basis			Previous Permit Basis			Draft Permit		
		Monthly Avg	Weekly Avg	Daily Max	Monthly Avg	Weekly Avg	Daily Max	Monthly Avg	Weekly Avg	Daily Max
CBOD ₅	Apr – May	13	19.5	---	13	19.5	---	13	19.5	---
	Jun – Oct	13	19.5	---	13	19.5	---	13	19.5	---
	Nov – Mar	25	37.5	---	25	37.5	---	25	37.5	---
TSS	Year round	30	45	---	30	45	---	30	45	---
Ammonia, total	Apr – May	4.1 ^b	---	9.9 ^b	4.5	6.8	---	4.1	---	9.9
	Jun – Oct	4.1 ^b	---	9.9 ^b	5	7.5	---	4.1	---	9.9
	Nov – Mar	4.1 ^b	---	9.9 ^b	12	18	---	4.1	---	9.9
Dissolved Oxygen (DO)	Year round	Instantaneous minimum: 5			Instantaneous minimum: 5			Instantaneous minimum: 5		
pH (std units)		6.5 – 9.0			6.5 – 9.0			6.5 – 9.0		

^a Units are mg/l, unless otherwise specified.

^b Toxicity-based basis

b. Monitoring Frequencies and Sample Types

(1) Evaluation for Performance-Based Monitoring Frequency Reductions

Performance-based monitoring frequency reductions for all parameters except pH are considered in accordance with OAC 252:690-3-91 and Chapter 3 of the CPP. Where Significant Noncompliance (SNC) with permit limitations has been exhibited during the period of record, the facility is ineligible for any performance-based monitoring frequency reduction for the affected pollutant. Any increased monitoring frequency requirement for ammonia resulting from toxicity-based ammonia limits replacing DO-based ammonia limits pre-empts any performance-based monitoring frequency reduction that might otherwise result from the evaluation using DO-based limits. OAC 252:690 does not include a mechanism for reducing the monitoring frequency of pH and DO. Results of the evaluation for other parameters are as follows:

Performance-Based Monitoring Frequency Reduction Evaluation (Outfall 001) (Period of Record – March 2002 through March 2004)

Effluent Characteristic ^a		Previous Permit		Performance				Eligible for Monitoring Frequency Reduction?
		Monitoring Frequency	Monthly Avg Conc. Limit	Long Term Avg	Ratio of LTA to Limit (%)	Any permit limit violations?	Significant Non-compliance (SNC)?	
CBOD ₅	Apr – May	Daily	13.0	2.5	19.2	No	No	Yes
	Jun – Oct	Daily	13.0	2.0	15.4	No	No	Yes
	Nov – Mar	Daily	25.0	3.0	12.0	No	No	Yes
TSS	Year round	Daily	30.0	5.2	17.3	No	No	Yes
Ammonia	Apr – May	Daily	4.5	0.57	12.6	No	No	^b
	Jun – Oct	Daily	5.0	0.52	10.4	No	No	^b
	Nov – Mar	Daily	12	1.64	13.6	No	No	^b
Dissolved Oxygen	Year round	Daily	5.0 (minimum)	5.6	---	---	---	NA ^c
pH (s.u)	Year round	Daily	6.5 – 9.0	6.7 – 7.8	---	---	---	NA ^c

^a Units are mg/l unless otherwise specified.

^b See discussion of ammonia toxicity-based limits and performance-based monitoring frequency reductions.

^c Not applicable.

(2) Monitoring Requirements and Sample Types

Based on monitoring requirements in OAC 252:690-3-90 through 3-91, and incorporating the results of the evaluation for performance-based monitoring frequency reductions in Section VII.B.1.b(1), monitoring requirements for Outfall 001 beginning the effective date of the permit are shown in the following table.

Final Monitoring Requirements and Sample Types – Outfall 001

Effluent Characteristic		Previous Permit		Draft Permit	
		Measurement Frequency	Sample Type	Measurement Frequency	Sample Type
Flow	Year round	Daily	Totalize	Daily	Totalize
CBOD ₅	Year round	Daily	24-hr comp	2/week	24-hr comp
TSS	Year round	Daily	24-hr comp	2/week	24-hr comp
Ammonia, total	Year round	Daily	24-hr comp	3/week ^{a, b}	24-hr comp
Dissolved Oxygen (DO)	Year round	Daily	Grab	Daily	Grab
pH	Year round	Daily	Grab	Daily	Grab

^a See discussion of performance-based monitoring frequency reductions.

^b The permittee may request a total ammonia monitoring frequency reduction for all seasons from 3/week to 1/week if the highest daily concentration, during the first year toxicity-based limits are in effect, is $\leq 1.5 \times$ monthly average limit (i.e., ≤ 6.9 mg/l).

C. BIOMONITORING OUTFALL (OUTFALL TX1)

Outfall TX1 is designated for biomonitoring reporting purposes. It is functionally identical to Outfall 001.

1. Previous Permit

The previous permit contained WET limits, and required only chronic WET testing. The monitoring requirements are described in the following table.

Previous Permit's WET Test Reporting and Monitoring Requirements (Outfall TX1)

Effluent Characteristics			Reporting Requirements		Monitoring Requirements	
Test	Critical Dilution	Parameter	30-day Min.	7-day Min.	Testing Frequency	Sample Type
<i>Ceriodaphnia dubia</i> , 7-day chronic NOEC static renewal, freshwater	100%	Pass/Fail Survival [TLP3B]	Report	Report	1/month (Apr – Sep)	24-hour comp
		NOEC _L Survival [TOP3B]	Report	Report	1/quarter (Oct – Mar)	
		NOEC _S Reproduction [TPP3B]	Report	Report		
<i>Pimephales promelas</i> (Fathead minnow), 7-day chronic NOEC static renewal, freshwater	100%	Pass/Fail Survival [TLP6C]	Report	Report	2/year (Year round)	24-hour comp
		NOEC _L Survival [TOP6C]	Report	Report		
		NOEC _S Growth [TPP6C]	Report	Report		

2. Draft Permit

WET Testing Requirements

During the period beginning the effective date of the permit and lasting through the expiration date, the permittee is authorized to discharge from Outfall TX1 (functionally identical to Outfall 001). Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristics		Reporting Requirements ^a	Monitoring Requirements		
Test	Critical Dilution	Parameter	7-day Min	Testing Frequency ^b	Sample Type
<i>Ceriodaphnia dubia</i> , 7-day chronic NOEC static renewal, freshwater	100 %	Pass/Fail Survival [TLP3B]	Report	1/quarter	24-hour comp
		NOEC _L Survival [TOP3B]	Report		
		% Mortality at Critical Dilution [TJP3B]	Report		
		Pass/Fail Reproduction [TGP3B]	Report		
		NOEC _S Reproduction [TPP3B]	Report		
		% Coeff of Variation [TQP3B]	Report		
<i>Pimephales promelas</i> (Fathead minnow), 7-day chronic NOEC static renewal, freshwater	100 %	Pass/Fail Survival [TLP6C]	Report	1/quarter	24-hour comp
		NOEC _L Survival [TOP6C]	Report		
		% Mortality at Critical Dilution [TJP6C]	Report		
		Pass/Fail Growth [TGP6C]	Report		
		NOEC _S Growth [TPP6C]	Report		
		% Coeff of Variation [TQP6C]	Report		

^a See Part II, Section A, Whole Effluent Toxicity Limit; and Section B, Whole Effluent Toxicity Testing, for additional monitoring and reporting conditions.

^b Results of retests conducted pursuant to prior test failure shall not be submitted on DMRs in lieu of routine test results unless routine monitoring frequency is monthly.

Whole Effluent Toxicity Limit and Monitoring Requirements (Outfall TX1)

Effluent Characteristic	Reporting/Monitoring Requirements ^a		
	Daily Min	Testing Frequency ^b	Sample Type
Whole Effluent Toxicity Limit (<i>Ceriodaphnia dubia</i> only) [STORET 22414]	100 %	1/quarter	24-hr comp

^a See Part II, Section A, Whole Effluent Toxicity Limit, for additional monitoring and reporting conditions.

^b Results of retests conducted pursuant to prior test failure shall not be submitted on DMRs in lieu of routine test results.

Whole effluent toxicity monitoring and reporting requirements apply beginning **the effective date of the permit**.

Compliance with Whole Effluent Toxicity Limit is required beginning **the effective date of the permit**.

WET testing summary reports: Reports of all WET testing initiated, regardless of whether such tests are carried to completion, shall follow the requirements of Part II, Section A, Item 3 and Section B, Item 4.

Whole effluent toxicity concurrent testing provision: Concurrent analysis of total ammonia and pH is required on each effluent sample, including static renewals, collected for fathead minnow WET testing or retesting. Monitoring and reporting of results shall be in accordance with the following requirements.

Concurrent Effluent Testing for Chronic WET Tests – Reporting Requirements (Outfall TX1)

Effluent Characteristic	Concentration			Monitoring Requirements	
	Daily Min	Monthly Avg	Daily Max	Monitoring Frequency	Sample Type
Ammonia, total (mg/l) ^a [STORET 00610]	Report	Report	Report	1/quarter	24-hr comp ^b
pH (std units) ^a [STORET 00400]	Report	N/A	Report	1/quarter	Measured in each composite effluent sample, including static renewals, just prior to first use ^b

^a Report only those effluent samples collected for WET testing of Fathead minnow species. Results of concurrent testing of pH and total ammonia shall not be used to satisfy reporting requirements that are specified elsewhere in the permit for Outfall 001.

^b Concurrent ammonia analyses must be performed on the composite samples actually delivered to the biomonitoring laboratory and used for WET testing purposes, not a separate sample collected at the same time the WET testing sample is collected. Just prior to first use of each composite sample for WET testing purposes, the biomonitoring laboratory shall take an adequately-sized portion of each composite sample, acidify it in accordance with preservation requirements in 40 CFR 136, and have it analyzed for total ammonia. The pH measurement reflected in the above table must be taken just prior to the acidification step.

D. BACKGROUND MONITORING (MONITORING POINT 999)

None.

E. COMPLIANCE SCHEDULE

None.

VIII. SUMMARY OF CHANGES FROM PREVIOUS PERMIT

The following changes were made in the draft permit relative to the previous OPDES permit.

- A narrative condition prohibiting the discharge of any visible sheen of oil or globules of oil or grease added.
- Water quality (DO)-based limits for ammonia deleted.
- Toxicity-based limits for ammonia added for all seasons.
- Performance-based monitoring frequency reductions for CBOD₅ and TSS granted.
- Diazinon alternative to WET limits deleted.
- Chronic whole effluent toxicity limits for *Ceriodaphnia dubia* species added.
- Testing of total ammonia and pH concurrently with chronic WET testing of Fathead minnow species added.

IX. ADMINISTRATIVE RECORD

The following sources were used to prepare the draft permit and constitute a part of its administrative record.

A. APPLICATIONS

- OPDES Permit Application No. OK0029190 (Form 2M1), received 06/22/04.

B. CLEAN WATER ACT CITATIONS

- Sections 301, 303(d), 305(b), 402(a) and 402(o).

C. 40 CFR CITATIONS

- 40 CFR Parts 122, 124 and 136.

D. STATE LAW, STANDARDS, AND RULES AND REGULATIONS

- Oklahoma Pollutant Discharge Elimination System (OPDES) Act, 27A O.S. §2-6-201 *et seq.*
- OAC 252:606, Discharge Standards (DEQ).
- OAC 252:690, Water Quality Standards Implementation (DEQ).
- OAC 252:515, Management of Solid Waste (DEQ)
- OAC 785:45, Oklahoma Water Quality Standards (OWRB).
- OAC 785:46, OWQS Implementation (OWRB).
- Oklahoma Continuing Planning Process (CPP) Document (DEQ).

E. MISCELLANEOUS

- Oklahoma 303(d) List.
- 2003 Beneficial Use Monitoring Program (BUMP) Report (OWRB).
- Permit file, OPDES Permit No. OK0029190, including selected biomonitoring laboratory reports.
- Permit Compliance System (PCS) data retrieval, January 1999 through March 2004.
- EPA Region 6 revision to Post Third Round Biomonitoring Policy dated June 30, 2000.
- USGS publication, Statistical Summary of Streamflow Records in Oklahoma Through 1999 (WRIR 02-4025), R.L. Tortorelli, 2002.

X. REVIEW BY OTHER AGENCIES AND FINAL DETERMINATION

A draft permit and public notice will be sent to the District Engineer, Corps of Engineers, and to the Field Supervisor of the U.S. Fish and Wildlife Service upon the publication of the notice. If comments are received from these agencies or other State or Federal agencies with jurisdiction over fish, wildlife, or public health, the permit may be denied or additional conditions may be included in accordance with regulations promulgated at 40 CFR 124.59.

The public notice describes the procedures for the formulation of final determinations.